Cold Case Files

The season for cold injuries is just around the icy corner; outdoor workers should approach it with caution.

by Ronnie Rittenberry

We interrupt this issue for an important seasonal report. The arctic winter air sweeping across the country within the next few months brings hazards most workers do not have to face the rest of the year. Slips and falls, road accidents caused by ice and snow, and carbon monoxide poisonings from faulty furnaces and automobiles all have elevated incident rates during the winter. In addition, multiple levels of injuries can result from exposure to the cold itself.

Any number of cold injuries can affect workers without adequate and dry protective gear. Chilblains, a condition in which skin repeatedly exposed to a dry cold can start to itch, turn reddish-blue, swell, and blister, is a common type of cold injury. "Trench foot," or immersion injury, can develop with exposure to a wet cold, usually when a glove or sock becomes damp, resulting in symptoms similar to but usually more serious than chilblains because the blisters are deeper, resembling those that form after a burn.

Although body parts affected by either chilblains or trench foot may afterward be very sensitive to the cold, neither injury is caused by tissue actually freezing, and usually neither results in permanent damage. The same cannot be said for hypothermia and frostbite. While workers can and do commonly suffer and recover from mild versions of both these injuries, under the wrong circumstances both can become severe, life-threatening medical emergencies.

Out in the Cold

Even in their early stages, hypothermia and frostbite can cause safety problems at the worksite. Hypothermia, which results when body temperature drops below 95 degrees F, affects the brain and can happen without a worker knowing it or being able to do anything about it. In its mild to moderate forms, it can cause muddled thinking or an outright inability to pay attention, as well as a loss of dexterity of the hands and feet.

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Frostbite, which also can develop painlessly and happen without a worker realizing it, causes a loss of feeling in the affected areas even in its mildest form, a condition sometimes called frostnip. Work-site frostbite usually affects exposed areas or extremities, such as fingers, toes, and parts of the face. Workers suffering from either hypothermia or frostbite--especially if their job requires operating equipment controls, holding heavy tools, or performing tasks such as climbing ladders--easily can become a danger to themselves and others.

OSHA advises caution specifically for construction, agricultural, and maritime workers, but anyone who must work outdoors in the cold could suffer from exposure and should take heed. Workers who are in poor physical shape or suffer conditions such as diabetes, hypertension, or cardiovascular disease face increased risks, as do those who consume alcohol or use tobacco, because of the substances' affects on circulation.

Depending on wind chill, the insulative quality and dryness of protective clothing worn, and the worker's health, hypothermia and frostbite can occur even when the temperature is well above freezing. With exceptions such as falling into icy water, hypothermia usually results from prolonged exposure to the cold. Frostbite, on the other hand, can happen fairly quickly, as Gene Hoyle of Washington, Iowa, discovered on New Year's Eve, 1992.

A Winter's Tale

It was a dark and stormy night in the Midwest. The temperature was an estimated -30 F, and, with 40- to 45-mph gales, the wind chill was an estimated -90 F--freakishly cold for southeastern Iowa, Hoyle said. Because his parents' livestock was farrowing on this inclement eve, Hoyle, then 48, was driving his father to his farmhouse to check on the animals when he lost control of his truck on the icy, snow-covered road. With the vehicle stuck in a ditch and another farmhouse in sight roughly 660 yards away, the men decided to bundle up, brave the elements, and walk. Though it took place 14 years ago this December, Hoyle recalls the trek vividly.

"It was so cold that we could not walk facing the wind--we had to turn around and back against it to make our way," he said. "Fortunately, we just walked a short distance to get to the house. We were out there only about 15 minutes. If we'd had to walk another half mile, I'd say, we would probably have had some real problems."

As it was, those 15 minutes of exposure were enough to result in frostbite on Hoyle's hands, nose, cheeks, and ears, which occurred despite the layers of protective gear he wore, including thermal underwear, insulated socks and boots, coveralls, hooded sweater, down jacket, gloves, and a thermal facemask. By the time he reached the farmhouse, Hoyle said, he couldn't feel his fingers.

"With as many layers of clothing as I had on, it still felt like I was in front of a wind tunnel with super-cold air blowing on me--or, really, right through me," he said. "After about a half-hour of immersing my hands in water they began to feel like they were painfully thawing out, but for several days after that my fingers didn't feel right; they were very sensitive, like they'd been burnt on the outside. All the other areas just peeled--and then my ears kept on peeling for several years. What surprised me, though, was how fast it happened. I didn't even know I'd been frostbitten until I'd gotten inside, out of the weather; but then I reached up and, oh, it just felt like my ears were on fire."

According to Thomas Adams, Ph.D., a professor of physiology at Michigan State University, Hoyle's fiery evocation is fitting, given the fact that the degrees of frostbite are graded in much the same way as are degrees of burns. The painful, cell-damaging "bite" in frostbite, he said, is caused not by the cold, per se, but by the dehydration that happens when ice crystals form not in the cells, but in the interstitial fluid of affected areas of the body.

"A person with first-degree frostbite, as with a first-degree burn, usually spontaneously recovers with some pain and swelling but no tissue loss. With second- and third-degree cold injury or frostbite, there is almost always some degree of tissue loss. Third-degree implies that the ice crystals have formed even down to the level of the bone," said Adams, who is also author of the book "Guidelines for Surviving Heat and Cold."

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If left untreated, severely frostbitten areas gradually darken after a few hours, in the worst cases becoming completely black, as if burned. In such instances, when the freezing of the interstitial tissue has destroyed blood vessels and otherwise reduced blood flow to such a great degree, the damage is permanent and gangrene can follow, which may require amputation of the affected body part. Adams noted, however, that frostbite symptoms and an individual's reaction to them vary widely.

"While living in Alaska, I've seen people who've had relatively mild frostbite, and six months later they've lost their fingers and toes," he said. "Then I've seen other people who've had blackened fingers, blackened toes, and six months later they're back to normal. So, yes, frostbite is a highly unpredictable injury."

Hypothermia and frostbite are best treated by getting victims out of the cold, preferably in a warm room, as soon as possible and seeking medical attention. According to the U.S. Centers for Disease Control and Prevention, hypothermia is a more serious condition and should be treated first for victims that have both. Anyone with a body temperature below 95 F should be considered a medical emergency and receive professional treatment. If such care is not available, the agency advises warming the victim by removing any wet clothing and warming the center of the body first--chest, neck, head, and groin--using an electric blanket if available, or, in absence of that, skin-to-skin contact under loose, dry layers of blankets, clothing, towels, or sheets. Warm, non-alcoholic beverages can help increase the body temperature, but only if the person is conscious. Once the body temperature has increased, keep the person dry and wrapped in a warm blanket, including the head and neck.

For frostbite, CDC advises immersing the affected area in warm--not hot--water or warming the affected area using body heat, enclosing frostbitten fingers within an armpit, for example. The agency cautions, however, that affected areas should not be massaged, and especially not rubbed with snow, which can cause more damage, as can walking on frostbitten feet or toes, which should also be avoided, if possible. Also, because

frostbitten areas are numb and easily burned, fires, stoves, radiators, and other sources of heat, such as heating pads or lamps, should not be used. And if it is unlikely that affected areas can be kept thawed, treatment should not be carried out, because twice-frostbitten areas could result in even more extensive damage.

The National Safety Council advises those who must work outdoors in the cold to eat a well-balanced diet; drink warm, non-alcoholic, caffeine-free liquids to maintain fluid levels; and wear layered protective gear, keeping in mind that the extra bulky, heavy clothing also sometimes can cause cold-related problems on the work site.

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Winter Car Kit

According to the Federal Emergency Management Agency, about 70 percent of winter deaths related to snow and ice occur in automobiles. When driving in such conditions is necessary, the agency recommends traveling in daylight and not traveling alone, keeping others notified of your schedule, and staying on main roads. In addition to winterizing your vehicle mechanically and keeping its gas tank full, FEMA advises carrying the following items in the vehicle's trunk:

- Shovel
- Windshield scraper
- Battery-powered radio
- Flashlight
- Extra batteries
- Water
- Snack food
- Mittens
- Hat
- Blanket
- Tow chain or rope
- Tire chains
- Bag of road salt and sand
- Reflective vest
- Booster cables
- Road maps
- Emergency triangle
- Cell phone or two-way radio

Source: FEMA

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